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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



APRIL 25, 1931

Not a Fairy's Furry Opera Cloak

See Page 259

SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

VOL. XIX

No. 524

The Weekly
Summary of  Current
Science

Published by

SCIENCE SERVICE

The Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by WATSON DAVIS

Subscription rates—\$5.00 a year postpaid. 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Special reduced subscription rates are available to members of the American Association for the Advancement of Science.

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Advertising rates furnished on application.

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Publication Office, 1930 Clifton Ave., Baltimore, Md. Editorial and Executive Office, Constitution Ave. at B St., N. W., Washington, D. C.

Address all communications to Washington, D. C. Cable address: Scienservc, Washington.

Entered as second class matter October 1, 1926, at the postoffice at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. Patent Office.

DO YOU KNOW THAT

The Bible contains 290 references to birds, and of these 177 refer to definite kinds.

A fourteenth century battle gauntlet recently dug up in Gothland consists of 106 small iron plates.

A mysterious lung disease which has been found in 125 miners is tentatively thought to be due to a fungus infection.

Fish that swim in open water are likely to be bluish or metallic in coloring, whereas fish that stay at the bottom of a stream are more often mottled or striped like the stones and sand.

American medical colleges graduate only about 200 women doctors a year.

The New York City aquarium provides seven different kinds of water for its various fishes.

It has been demonstrated that leather can be made waterproof on the outside and still allow perspiration to pass from the inside of a shoe 80 per cent. as fast as from the bare foot.

Snakes have no eyelids.

A project to establish a \$10,000,000 Gaelic university in the Scottish highlands is under way in the United States.

Through the aid of a continual flow of oxygen, sparkling pure water and fertilizers are now produced from sewage.

While the United States was experiencing a mild winter this year, Harbin, Manchuria, reported an excessively cold winter, with temperature falling 45 degrees below zero and more than a thousand persons frozen to death in the streets.

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Science Service presents over the radio, an address

RADIO AND RESEARCH

By Dr. A. E. Kennelly, professor emeritus of electrical engineering at Harvard University, who shared in the discovery of the Kennelly-Heaviside ionized layer.

Friday, May 1, 2:45 P. M. Eastern Standard Time

Over Stations of

The Columbia Broadcasting System

PSYCHOLOGY

Many Old People Work Faster Than Average Adults

Study Showing Fourth of People Over 74 As Fast As Adults Indicates Unfairness of Automatic Retirement

NOT all old people are slow workers. Probably from one-fourth to one-third of persons over 74 years of age could release the accelerator of an automobile at the approach of danger as quickly as the average adult. And these aged persons differ in speed just as do those who are in their thirties or forties.

These facts were among those reported to the New York branch of the American Psychological Association meeting in New York by Dr. Walter R. Miles, professor of experimental psychology at Stanford University.

Dr. Miles has been making a study of "later maturity" at Stanford under a special grant from the Carnegie Corporation. So far he has examined psychologically a total of 800 persons from all walks of life, excepting only the illiterate. A special study of reaction and co-ordination speed was made for 100 of these selected at random. The ages ranged from 25 to 87 years.

Commenting on the custom of retiring or dismissing an employee who has reached a certain chronological age, Dr. Miles said:

"Age is usually one of the important factors which define physiological and psychological efficiency. No machine can last forever; action necessarily means the reaction of wear and tear. But as the data presented in this paper indicate, there are distinct and measurable efficiency differences between individuals with chronological ages about seventy years, just as there are differences among people who are in their thirties or forties. The average for all who are older than 74 years, for example, may show a decrement of one-fourth or one-third from the general adult mean. But, on the other hand, one-fourth to one-third of these old people may still be as capable, in the functions tested, as the average adult, and to check them off just because they happen to have been born seventy or more years ago may be as unfair to the individual as to drop him because he was born of foreign parents.

"Psychologists have convinced themselves and the educational world that

there is such a thing as mental age, which, although it may ordinarily run a parallel course with chronological age, does not do so in all cases. And for this reason individuals must be considered, rather than arbitrarily lumped in calendar year units. Investigation such as is reported by the present sample of data indicates that calendar worship should be further curtailed as related to the problems and adjustments required in human life at its stage of later maturity."

The measurements of speed were made by an ingenious electrical device which not only timed the movements made by the persons tested, but also gave the signal to which the person was to respond. It times as closely as a one-hundred-twentieth of a second.

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BOTANY

Fungus Beautifies Self With Fur-Trimmed Edge

See Front Cover

THE PICTURE on the front cover of this week's SCIENCE NEWS LETTER looks like a fur-trimmed opera cloak for

ASTRONOMY

Four Separate Spheres Make up Single Star in Great Bear

THE STAR XI Ursae Majoris, one of the fainter members of the constellation of the Great Bear, appears as a single body to the naked eye, but astronomical research has revealed that it actually consists of four stars. They are arranged in two pairs. Each member of each pair is revolving around its mate, while each pair in turn revolves around the other pair.

On the old star maps, xi Ursae Majoris was represented as forming part of the bear's right hind foot. It is almost directly overhead about 9:00 p. m. at this



MEASURING HER SPEED

In performing an operation like those necessary in industry. The electrical clock device is disconnected while her fingers remain on the key. When she is ready she will lift her hand, thus starting the clock, move the peg to the next hole, and return her finger to the key which stops the clock. The time is automatically recorded.

Queen Titania of the fairies, but it is nothing more romantic than a rather common small fungus, *Schizophyllum commune*, that feeds on dead sticks in the woods.

The furry effect is due to the splitting and shredding of the edges of the cap. The photograph, which shows the plant at several times its natural size, is the work of Cornelia Clarke.

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time of the year. High in the west is the familiar "Sickle" of Leo, with the brilliant Regulus at the end of the handle, pointing downwards. If you imagine a line from Regulus to Benetnasch, the end of the handle of the Great Dipper, it will cross xi Ursae Majoris almost in the middle.

Working at the Lick Observatory, Mt. Hamilton, Calif., Louis Berman has made a detailed study of the star, and has determined more accurately than ever before the dimensions of the system. Through a medium-sized tele-

scope, the star is resolved into two components. Some years ago it was found that the brighter of these stars oscillates back and forth every 22 months. This is caused by a close companion which has never been observed.

The fainter of the two stars seen in the telescope was found, in 1918, to be also double. Studies of its spectrum, obtained by analyzing its light through the prisms of a spectroscope, showed the dark lines to move back and forth every few days, thus indicating that it also is double, though the two stars cannot be observed directly. Dr. Berman's study shows that these two make a revolution every four days.

He also finds that the star is at a distance of 26 light years, thus making

it one of the nearest stars in the sky. The orbit in which the two members of the brighter part revolve is almost edge-wise to us, and he suggests that perhaps about next February 4 or 5 the dark body may eclipse the visible one.

The fainter pair has a combined mass about the same as that of the sun, while that of the brighter pair is about 25 per cent. greater. The two stars visible in the telescope are each a little smaller than the sun, the brighter being 795,000 miles in diameter, and the fainter 700,000 miles; compared with 865,000 miles for the sun. The distance separating these two stars is about 20 times that between the sun and the earth, or about 1,858,000,000 miles.

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PHYSICS

Briton Suggests That Speed Of Light May Be Decreasing

Each Determination Consistently Lower Than Predecessor; Michelson's Present Work to "Settle it Once For All"

CRITICS of modern civilization who complain that everything goes more rapidly now than it used to are wrong in one important particular, if a suggestion made in the pages of *Nature*, leading British scientific weekly, is correct. The startling idea is advanced by M. E. J. Gheury de Bray that the speed of light is gradually diminishing. Previously scientific thought has regarded the speed of light as one of the most constant things in this changing world.

Mr. de Bray points out that each measurement of the speed of light is consistently lower than its predecessor. He cites the figures for the last three determinations in the present century. In 1902 the French physicist, Perrotin, found it to be 299,895 kilometers a second. In 1924 Prof. A. A. Michelson, in California, found it 299,802 kilometers, but when he repeated his work in 1926 the result came out 299,796 kilometers. Then, in 1928, two Germans, Karolus and Mittelstädt, obtained a value of 299,778 kilometers. These indicate, says Mr. de Bray, a steady decrease in the velocity, even though the possible errors of some of the values might explain the discrepancy between two adjacent values. Also, he points out, eighteen other determinations fit in with the idea of "a decrease in the ve-

locity of light, while there is not a single one against it."

In his communication, he does not consider at length the possible cause of such a decrease, but he does make one suggestion. "The velocity of light," he says, "is affected by magnetism, and the measurements of this 'constant' are performed in a magnetic field of varying intensity, namely, the earth's magnetic field, yet no correction seems to be applied to allow for this variation in the physical conditions in which the experiments are carried out, or in any other which may be present." Also, he says, it has been shown that a decrease in the velocity would not contradict the theory of relativity.

Prof. Michelson is now in Pasadena, California, completing a new and still more accurate determination of light's speed. Mr. de Bray believes that this work will "settle it once for all."

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ARCHITECTURE

House Built Without Regard For Precedent

A THOROUGHLY modern house designed with utter disregard for architectural precedent and with all pos-

sible consideration of modern invention has been built in the Grand Central Palace by the Architectural League of New York.

Glass, steel and aluminum are the principal building materials, and here are some of the features of the new house: Three-inch walls weighing only one-twelfth as much as concrete and steel and protecting the occupants from heat and cold better than 14 inches of masonry; glass walls at two ends of the living room; no cellar because it is useless and expensive; garage and heating system on the ground floor; a flat roof made into a garden terrace; folding partitions enclosing rooms; a rubber-surfaced dining table that rolls up out of the way on a cylinder; and artificial light closely approximating daylight from low voltage gas tubes sunk in the ceiling over the windows with an additional controlled source of ultra-violet light.

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NUTRITION

Soybeans Recommended As The Ideal Human Food

SOYBEANS, three million acres of which are raised for cattle food and other agricultural uses in this country, have been recommended to the American Chemical Society as the ideal human food by Dr. A. A. Horvath, now of the U. S. Bureau of Mines, Pittsburgh, but formerly in charge of extensive soybean research at the Peking Union Medical College, China.

Nearly half of the world's total population uses soybeans daily as a protein food, replacing meat. A hundred generations of Chinese have been raised on this source of protein, and Dr. Horvath called this one of the world's most extensive biological experiments. Its protein, or meat-like constituent, is extremely well balanced, containing some necessary amino acids that milk and meat do not provide. Forty per cent. of the soybean is protein, while twenty per cent. is oil. It contains all the vitamins and counteracts acids within the body.

Dr. Horvath explained that one pound of soybeans costing wholesale two cents contains as much protein and fat as two pounds of beef. A new Austrian process is now being used to remove the beany taste from soybean flour and make it suitable for wider general use.

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PSYCHOLOGY

Temper and Muscular Tension Result From Lack of Sleep

Psychologist and Wife Find it Hard to Be Congenial After Getting Little Sleep For Two Weeks During Experiment

IF YOUR wife's temper suddenly becomes unreasonable, or if you greet her in the morning with a cantankerous outburst, it may be only because neither of you had sufficient sleep the night before.

Members of the New York branch of the American Psychological Association heard last week how lack of sleep upsets domestic tranquillity and of the effects it has on the body machinery.

Your working efficiency may be kept up to normal on the day after a serious sleep loss, they learned, but in that case you will operate under a high degree of muscular tension. And if you persist in your late hours, this tonic muscular compensation which enables you to keep your output up to par will tend to lose its efficacy.

These effects of loss of sleep were found by Dr. G. LaVerne Freeman, of Yale University, through experiments he has been conducting in the psychological laboratory of the newly formed Institute of Human Relations.

Dr. Freeman's first experiments were conducted on himself and his wife. He described the manner in which their social lives were affected by the sleep loss.

"One of the most interesting side-lights of the major experiment was the effect of the sleep losses upon general and social behavior," said Dr. Freeman. "Aberrations in mode of living, health, attitude toward work and other individuals become characteristic occurrences after the first week of experimentation.

"Both subjects began the work in unusually fine health and spirits. Subject S in particular did not expect to suffer any marked effect from the experimental variations. It was planned to continue the routine of living in the usual way.

"But this proved impossible. By the end of the second week, both subjects were finding it increasingly difficult to be sociable. F's contacts with his colleagues were frequently tinged with caustic jibes. And the cantankerous outbursts which occasionally occurred be-

tween the two subjects were often quite uncivil.

"Prior to the tests, both subjects were reputed to be very congenial. With the relative fatigue of these acquired 'graces' and the release of adjustment patterns of lower order, it became necessary to forego attendance at all social events in order to preserve this reputation.

"Irritability and childish behavior persisted throughout the experiment."

The experiments showed that you cannot "catch up" on sleep in a single night. Even a ten-hour period of sleep failed to make up for the effects of four hours loss of sleep on the night before, and eight hours on the third night still left the person not entirely recovered.

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ARCHAEOLOGY

Explore Aztec Town Covering 12 Square Miles

RUINS of the big prehistoric town of Calixtlahuaca, which is to say "Prairieville" in Aztec, are now being excavated by the Mexican government under the direction of José García Payón.

The archaeological site over which the ruins of the ancient city spread covers no less than twelve square miles.

The plan, now traced, shows that a series of pyramids was built on the slopes of a range of low mountains. The pyramids were connected among themselves by giant terraces and paved causeways. A great quantity of pottery and other remains have been unearthed. These have been classed as ranging from the most primitive of Archaic art style to the finest of the styles known at the time of the Spanish Conquest. A method of sculpturing stone in relief not found elsewhere in Mexico has been located at this ruined city. One of the ruins, still only partially excavated, appears to have been the city's ball court where games were played.

A round temple, built in layers like a five-storied cake, was discovered several months ago and is still not fully unearthed. It is a special center of interest for archaeologists who point out that round buildings were rare in ancient Mexico and little is known of their use.

One other round structure is known to exist on the mainland of Mexico. This is at Cuicuilco, in the midst of a thirteen-mile lava flow and is a far more primitive building than the round temple found at Calixtlahuaca. Two other round structures are known at present in the Mayan peninsula of Yucatan.

Dr. Manuel Gamio, Mexican anthropologist, has explained that the newly excavated round temple at Calixtlahuaca may be planned after the type of Aztec round buildings built as temples for the Plumed Serpent, god of the air. Or, he adds, it may be a transition between the primitive round building at Cuicuilco and the typical Aztec style.

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CONCRETE COOLING TOWERS AMERICA DOES NOT NEED
These huge towers with an hourly circulation of 5,000,000 gallons cool condenser water at the modern Hams Hall generating station, Birmingham, England. In this country it is usually possible to build power plants near streams where a continuous supply of cool water is available.

Electrical World

CHEMISTRY-PHYSICS

Chemical Music and Its Meaning

The Transposition of Atom Vibrations Into Harmony Suggests A Possible Link Between Music and Science

By D. LINDSAY WATSON

HAVE you ever tried gasoline on your piano? Or alcohol? Or water?

This is not a household hint but a contribution to science, for Dr. Donald H. Andrews of Johns Hopkins University has transposed the vibrations of chemical atoms, written them as music and played them as modernistic musical chords and runs.

Try these chemical theme songs on your piano. The melody of the gasoline that runs your auto is frankly reminiscent of jazz—it reminds one of the Rhapsody in Blue. Water, played by Dr. Andrews, is a pleasing ripple on the notes of the piano, like a waterfall, clear and sparkling. Alcohol gives a rich, resonant chord, dreamy and seductive.

Every chemical substance sings a song of its own which can be written and played as music. By this fact a new source of thematic material is opened up to the composer. By reversing the process the skeptical chemist may find that favorite melodies or chords can be translated into chemical formulae.

The analysis of familiar music, in the light of Dr. Andrews' idea, should give interesting results. It may be that the love songs of a Mozart opera are the transposed spectra of sugar, and that the agonized discords of Strauss merely depict the chemistry of a stomachache. The passion of a Wagner scene may turn out to be a powerful drug.

One of the most important fields of scientific research today is the probing of the chemical constitution of matter. In this sector of science Dr. Andrews has been working. He has been studying the way in which substances are put together, how the separate atoms of their molecules vibrate when they give off light and other radiations.

Every little atom has vibrations all its own. The rainbow spanning the summer sky gives scientific evidence of the vibrations of the atoms. Every color of light has its own period of vibration. The many-hued bands in the rainbow, which is a natural spectrum, each origi-

nate in matter of certain vibration rates.

Artificial rainbows are produced when light passes through a triangular piece of glass like the ornaments on old-fashioned chandeliers. Closely inspected, these spectra show lines running across them. Physicists have given a lot of attention to those lines for they give a means of telling what sort of vibrations are going on in the light and in the substance they come from. They can be photographed and thus recorded.

A spectrum photograph is a sort of finger-print of the light-producing atom or molecule. Each line or color in the spectrum corresponds to a definite rate of vibration in the substance. Different colored lights differ only in frequency or number of vibrations. By measuring the distance apart of the various lines the scientist can tell exactly what contortions the parts of the light-emitting molecule are undergoing.

Several methods of cross-questioning the molecule are employed. Dr. Andrews has been especially interested in the kind of spectrum that recently won the Nobel prize for its discoverer, Sir Chandrasekhara V. Raman. Raman used the idea that a substance may reveal its secrets more easily under the influence of light not its own. This method has the advantage of telling about the vibrations of whole atoms which form part of the molecule.

Lines of Spectrum Shift

The Raman spectrum of alcohol, for instance, is the rainbow scattered from the substance when strong light from a mercury arc or other lamp plays on it. The lines of the mercury spectrum are found to have shifted because of the action of the alcohol molecules on the mercury light. The amount of the shift gives a measure of the number of vibrations made each second by some part of the molecule.

Models were constructed at the Johns Hopkins Laboratory by Dr. Andrews and others to help in explaining these vibrations. (SNL—Jan. 17, '31.) The molecule models were made of steel balls and springs. Dr. Andrews played



DR. DONALD H. ANDREWS

He has transposed the vibrations of chemical atoms, written them as music and played them as modern musical chords and runs.

with these quivering models a while and found that by transposing the Raman "shift"-vibrations, the various natural vibrations of the model could be obtained. The Raman spectrum is the physicist's musical score of the atomic symphony.

The success of this work gave Dr. Andrews the idea of transposing the spectra into sound vibrations.

Sound, like light, is also a vibration but in a different physical medium, the air. The vibrations of light travel in the ether, whose real nature is still a mystery to physicists.

There is another important difference between sound and light. The vibrations of the parts of a molecule causing light waves are about a million, million, million times more in each second than for ordinary sound vibrations. Sound vibrations begin in the vocal cords or instrument and travel out as waves. Noise is irregular vibration. Music is rhythmically recurring vibration, anywhere from 20 to 15,000 cycles per second. Twenty would be a scarcely audible rumble, 15,000 the shrillest squeak.

The transposition of the Raman spectrum on to a musical scale offers no

real difficulty. The answer of most scientists to the proposal to do this would be "what of it?" or "why bother?" So they never tried it. And thus it was left to Dr. Andrews to wonder if perhaps hidden harmonies are to be found in the spectra. For the essence of harmony is in the relations between the vibrations of the several notes, not in the actual number of vibrations of a single tone.

30 Billion Times Faster

By a simple trick, it is possible to get a very good idea of what atoms would sound like if we could tune our ears to them. Dr. Andrews noticed that the Raman frequencies when divided by a constant number, 30,000,000,000 (which is the velocity of light) gave rates of vibration corresponding to notes at the top of the piano keyboard. These are well known to physicists as the wave-numbers of the lines. By reducing these musical notes two octaves the whole spectrum can be brought to the middle of the piano.

Benzene, water, alcohol, gasoline and wood alcohol are among the first substances tried. Decidedly characteristic and sometimes pleasing effects were obtained. Wood alcohol, in sharp contrast to the grain alcohol, had a vicious sound curiously in keeping with its drastic physiological effects.

A significant link between chemistry and music has thus been forged. To every chemical substance there corresponds a Raman spectrum and, therefore, a possible combination of musical notes. The notes for a given substance can be written or played as a chord, that is simultaneously, or as a melody consecutively.

Composers who seem to be hard put to it to unearth bizarre material may be expected to welcome this unexpected assistance from science. Without making any assumption as to the significance of a given chord it is perfectly possible for them now to go in search of inspiration to the laboratories of physical optics where the Raman spectra are being measured.

The entrance of the snappy "vamp," for instance, would be heralded by the chord of iron oxide, Fe_2O_3 (or rouge) played by the oboe. A cold in the head would be symbolized by the aspirin motif, the heroine by geranium, a constituent of rose perfume, a mosquito by citronella. The chords of alcohol and gasoline would no doubt find wide use in a modern composition.

The body is a harp of a thousand strings. Our liking for a melody may be because we too can vibrate to it like the molecule from which it came.

The chemist in search of new dye-stuffs will now have a new source of information. He will simply search for a particularly iridescent passage in Debussy. After a calculation he can write down the formula of a brilliant colored substance and proceed to make it in his laboratory.

All this may seem far removed from "serious science." Suppose you look back again for a moment. Why do some combinations of tones sound pleasant, others harsh and discordant? This question has been a puzzle to physicists and philosophers throughout history.

Pythagoras, the ancient Greek philosopher, was fairly near the answer when he sought for the causes of harmony in the occult miraculous power of numbers—especially simple numbers.

"In listening to music," said Leibnitz, celebrated German mathematician, "the mind is counting without knowing it."

Think that over. Doesn't it take us very near to a scientific meaning of these chemical melodies? And very near to nonsense too?

A note of 400 vibrations each second played along with one of 200 per second sounds very pleasing. The first would, in fact, be just an octave above the second. On the other hand, notes of 210 and 200 sound very discordant together; but 300 with 200 is harmonious.

In this sense certainly, Leibnitz is mysteriously right.

If then, on playing Dr. Andrews'

chemical chords scientists find that pleasing combinations of tones are more frequent they would be justified in looking back to the Raman spectra with the expectation of finding simple numerical relationships between the frequencies of a given molecule.

Dr. Andrews, however, makes no claim that his work has shown this. Too much emphasis must not be placed, for instance, on the fact that the chords of benzene and alcohol have some well-known harmonic groupings among their notes. It is, he admits, possible that simple underlying relationships do, in some cases, connect the notes of a chemical harmony, but the experimental results do not as yet permit him to draw such a far-reaching conclusion.

It remains an attractive possibility with perhaps a little support from theory. It would indeed be reassuring to find that common substances of our acquaintanceship gave, on the whole, a good account of themselves constantly emitting a pleasing combination of radiations.

The important thing is that a new method has been brought into play in chemistry, throwing a different kind of light on the experimental facts. We can now perceive the fundamental relations by another sense—a fact of immense significance for the development of science.

Truth and Emotion

This is, however, dangerous ground we are on. Scientists have always believed that they cannot reach the truth unless they can keep their emotions from interfering with their work. Yet music appeals almost entirely to emotion.

How can science learn anything from such a treacherous ally?

You have heard of Einstein's violin. The greatest scientific figure of our age performs on the violin with the skill and feeling of a professional. He has given successful recitals. You may object that Einstein's love of music does not enter into his science. Perhaps it does in the following sense.

(Turn to page 271)



THE MUSIC OF THE ATOMS

It may be played either as chords, or one note at a time, as a melody. In the latter case the time is invented and has no scientific meaning. Only the pitch is derived from the Raman spectra. A composition using the chord of water has been made by Abram Moses, formerly of the Peabody Institute of Music, Baltimore.

MEDICINE

Own Blood Transfusion Saves Auto Victim's Life

AN AUTO victim's life has been saved by transfusion with his own blood, Dr. A. Lincoln Brown and Dr. Martin Warren Debenham of the University of California Medical School, San Francisco, have just reported to the American Medical Association.

The blood was removed from the patient's chest, where it had seeped from a cut blood vessel. It was filtered and pumped back into the vein of his right arm, just as in any ordinary transfusion, only in this case no outside donors were needed. The patient's own blood, loss of which was killing him, was reclaimed and used to restore him to life. The patient is described as "G. K., a white man, aged 42."

"We do not consider it true surgery to withdraw good blood and throw it away," Drs. Brown and Debenham commented.

Only one other similar case has been reported, but the San Francisco surgeons did not know of it when they undertook their first case. They considered their operation a "final heroic attempt to save the patient's life."

Encouraged by their success, they have repeated the operation on two other patients. One was a nineteen-year-old youth who had been stabbed in the chest during a street fight. The other was a man who had a gunshot wound in the chest.

In their second case, the surgeons delayed the transfusion until the blood had been examined for disease germs, since there was a chance that the blood had become infected by the stabbing knife. No germs were found and the surgeons subsequently learned that if the blood had been infected, it would have clotted and so been unsuitable for transfusion.

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PHYSIOLOGY-PSYCHOLOGY

Physical Effects Of Emotion Impair Mental Efficiency

THE IDEA that a person can do better mental work under the influence of emotional excitement is not upheld by experiments performed by Dr. Arthur T. Jersild of Columbia University and Dr. William S. Thomas of New York City, but fear and other intense emotion does seem to help the performance

of physical work. The results were reported to the New York branch of the American Psychological Association.

The scientists produced the bodily changes which usually accompany emotional excitement artificially in the subjects by giving them hypodermic injections of adrenal extract. To check the work, they gave them at other times injections of saline solution. Besides marked changes in pulse and blood pressure, the subjects showed many differences in behavior. They became irritable and even irascible, and were subject to tremor, stuttering, and weeping.

Mental efficiency was lowered and motor efficiency increased on the days when the adrenalin injections were given.

Science News Letter, April 25, 1931

ASTRONOMY

Galileo Declared Not First To Discover Jupiter's Moons

ANOTHER commonly accepted historical idea is wrong, according to the conclusions of J. H. Johnson, in a report to the British Astronomical Association. His researches indicate that it was the Bavarian astronomer, Simon Marius, who first observed the moons of Jupiter, in December, 1609. It was not until the following month that Galileo, in Italy, observed them. Mr. Johnson does not suggest that the Italian plagiarized the work of Marius, but apparently, like many great discoveries, the satellites of Jupiter were found independently by two different observers.

In one of his books, Marius tells how his friend and patron, John Philip Fuchs, attended the autumn fair at Frankfurt in 1608, where a Belgian showed him an instrument that made distant objects appear close. Fuchs and Marius tried to make one, but failed. In the summer of 1609, however, they did obtain a telescope from Holland, and with it Marius made astronomical observations, discovering the moons before the end of the year.

Later, Galileo himself disputed the claims of Marius, but apparently he was not justified in so doing. Mr. Johnson concludes that Marius "was an honest man and that his claims were not exaggerated. If we admit them we must recognize that he was the first both to notice the existence of the satellites and to detect their revolution, but that Galileo was the first to observe their full number."

Science News Letter, April 25, 1931

IN SCIENCE

ECOLOGY

Soil on Mountain Heights More Acid Than in Valleys

THE HIGHER the sourer, seems to be the rule regarding soil reactions. Confirming by researches in the richest forest region in eastern North America the observations of other investigators in various parts of the world, Dr. Stanley A. Cain of Butler University has collected a considerable series of data from the Great Smoky Mountains region in Tennessee and North Carolina, which is to be developed as the greatest of the U. S. National Parks in the East.

Starting with a moderate degree of acidity in the valleys, Dr. Cain found that the soil became more and more sour as he climbed the mountains, reaching the summits and the highest acid concentrations at the same time. The soil reaction was correlated with different types of vegetation.

Science News Letter, April 25, 1931

MEDICINE-CHEMISTRY

Chemical Will Relieve Amebic Dysentery

ACHEMICAL specific for amebic dysentery disease was reported by Dr. Frederick R. Greenbaum of the Searle Research Laboratories of Chicago to the American Chemical Society at its recent meeting in Indianapolis. It is chiniofon, chemically known as iodoxyhydroxy-quinoline sulphanate, a drug that has been used in Germany for some fifty years under the name of yatren. It is now manufactured in America.

This chemical given for a week will relieve cases of amebic dysentery if they are caught early. Since Dr. Greenbaum gave estimates that about ten per cent. of the population of the southern states suffer from this disease, it is a medical problem for this country as well as for other countries such as China where four out of ten coolies are said to have the disease.

The disease has been reported among food handlers of the northern United States, and it is sometimes mistaken by physicians for cancer of the liver.

Science News Letter, April 25, 1931

SCIENCE FIELDS

AERONAUTICS

Hotter Engines to Make Planes More Efficient

HOTTER airplane engines that will save weight, reduce drag, decrease fuel consumption and simplify control are a coming development in aviation, it is indicated in a report made last week, at the National Aeronautic meeting of the Society of Automotive Engineers by Arthur Nutt, vice-president of engineering for the Wright Aeronautical Corporation.

These advantages are to be gained by the use of high temperature coolants, Mr. Nutt explained. Both evaporative cooling, which has been tested experimentally during the past two years on automobile and aircraft engines, and the use of high boiling point liquids have been considered.

"The liquids that have been found satisfactory from a standpoint of boiling point, freezing point, and viscosity at various temperatures are ethylene glycol and di-ethylene glycol, the latter being selected owing to the fact that it will not freeze at any ground atmospheric temperature providing five per cent. water is mixed with it," the report stated. "This amount will not boil off up to 320 degrees Fahrenheit, so that such a mixture is satisfactory."

Science News Letter, April 25, 1931

CHEMISTRY-MEDICINE

Better Anesthetics Result From Chemical Research

MORE effective sleep-producing and anesthetic drugs have been produced through research by Dr. H. A. Shonle of the Lilly Research Laboratories, Indianapolis.

The possibility of predicting the duration and the effectiveness of hypnotic sleep-producing drugs that have not yet been synthesized by the chemist is stressed in a report to the American Chemical Society.

Through the use of a new group of anesthetics, known as the amyl ethyl barbituric acids, developed by Dr. Shonle and his associates, it is possible for phy-

sicians to reduce the nausea that often follows operations, give the patients greater comfort and subject them to far less mental distress.

These amyl ethyl barbituric acids will not replace ether and other major anesthetics but they find use as substitutes for morphine in making the patient ready for the unpleasant experience of an operation. Since the new compounds are not habit-forming like morphine and other opium preparations, there is no danger of causing drug addiction through their use.

The new drugs are closely related to veronal or barbital, a synthetic compound that has found use in medicine as a sleep-producing drug. Alcohol, which Dr. Shonle calls the "simplest hypnotic," is one of the constitutional parents of the new anesthetics. Part of the alcohol molecule is replaced with barbituric acid, then a part of the barbituric acid is replaced with what chemists know as an amyl group. This makes the anesthetic action more rapid and the patient recovers faster. If plain alcohol were used, fifty times the dose of barbituric acid would be necessary to produce the same hypnotic effect.

Science News Letter, April 25, 1931

CERAMICS

Knife-Marked China Is Investigated by Scientists

WHY does cutlery sometimes leave unsightly marks on china which cannot be removed by washing?

Scientists at the U. S. Bureau of Standards are investigating the question, following complaints that the stroke of cutting even a tender piece of meat on a plate or platter is often sufficient to scar the housewife's dishes permanently with pencil-like markings.

Some factor in the baking process of china may account for the fact that some pieces appear immune to cutlery markings, while others are readily discolored, the preliminary findings show. An excess of carbon in the furnace did not appear to make the dishes susceptible to marking but sulfur dioxide gas in the furnace did make the china more liable to scratching with metal.

Dishes just removed from the oven and not washed after their baking marked readily, as did glass surfaces that had been dried by heating at a temperature above 400 degrees Centigrade. When the glass surface retained some moisture to act as a lubricating film, the marking did not occur.

Science News Letter, April 25, 1931

PSYCHOLOGY

Sometimes Better To Memorize by Part

THE OLD problem which has bothered teachers for years, whether it is easier to learn material all together or split up into small parts, has received a new and compromising answer as a result of research conducted by Dr. Leland W. Crafts of New York University and reported by him to the New York branch of the American Psychological Association.

For the material to be learned, Dr. Crafts used a series of geometric forms. Some of them were irregular arrangements of circles, others were irregular figures, and still others arrangements of unrelated lines. He showed them to those who took part in the experiment for a short time, then allowed them to try to reproduce what they had seen.

It was discovered that in the case of the figures and circles, the learning was easier when the whole pattern was presented at one time. On the other hand, the unrelated lines were memorized best when the part method was used.

"These results suggest," Dr. Crafts concluded, "that in the field of visual 'perceptual' as well as in that of 'motor' or of verbal learning, neither the whole nor any one form of a part method will invariably be superior, and that the whole method can be expected to be especially advantageous with easier and with more closely related materials."

Science News Letter, April 25, 1931

HOME ECONOMICS

President Hoover Dines On 24-Cent Meal

PRESIDENT and Mrs. Hoover dined Thursday on a meal costing 24 cents a plate at a dinner given in the Girl Scouts' "Little House" in Washington, inaugurating the national celebration of Better Homes Week which begins Sunday, April 26.

Five girl scouts cooked the dinner which was planned by the Bureau of Home Economics of the U. S. Department of Agriculture to demonstrate the low cost health diets which have been developed by government food experts to meet the employment emergency.

Soup, a meat course, dessert and salad were included in the low price meal, which cost \$1.89 for the eight guests or \$.236 per person.

Science News Letter, April 25, 1931

PHYSICS

Mysterious Nucleus of Atom Yields Secrets to Bombardment

Cambridge Investigators Learn From Rays of Polonium That Core of Atom is Probably Built Like Its Outer Shell

THE MYSTERIOUS inner core of the atom is probably built on the same lines as the outer shells, that is, like an uneven staircase.

Drs. J. C. Chadwick, J. E. R. Constable and E. C. Pollard, of the University of Cambridge, England, have bombarded a variety of atomic nuclei with fast moving alpha rays from polonium, a radioactive element. They found that energy is done up in packets or quantised in the nucleus as elsewhere in the atom.

"What is happening in the inner core of the atom?" is the question that is being asked now in many laboratories of physics. The nature of the electron layers that form the bulky outer coat of the atom is well known but the very small nucleus which gives matter its weight is still a problem.

Protons, electrons and alpha particles are the constituents of the nucleus, say these Cambridge scientists. The protons are themselves nuclei of the smallest atoms, that is of hydrogen, while the alpha particles are helium nuclei.

Protons have been ejected from certain atoms by Dr. Chadwick by bombarding them with the rapidly moving alpha particles from polonium, an element very like radium.

Two things may happen. The destructive alpha particle may be swallowed up by the second nucleus or it may escape again. In both cases Dr. Chadwick found proton rays were produced.

If the alpha particle penetrates the target nucleus, protons of only two or three definite speeds are produced. Thus only limited and fixed amounts of energy can come from the nucleus at these times and fresh evidence is found for the quantum theory which has been so powerful in probing the structure of the atom.

Non-penetrating collisions, however, lead to protons whose speed depends on the speed of the guilty alpha particle. As might be expected more of such protons are found moving along the line

of motion of the hitting alpha particle than in other directions.

The proton speed groups have given the Cambridge scientists proof of the existence of energy levels in the nucleus, at least so far as the protons are concerned.

Nothing is yet known about the behavior of the electrons in the nucleus.

Science News Letter, April 25, 1931

SAFETY

Speeding Autos Slow Flow of Traffic.

IF YOU drive through city traffic at 45 miles per hour you slow up traffic as much as though you drive at less than 10 miles per hour. This is shown in data presented by the traffic committee of the City Officials' Division of the American Road Builders' Association.

They have found that a speed limit of 23½ miles per hour will allow the

MEDICINE

Not Enough Oxygen Causes Condition Resembling Insanity

AN EMOTIONAL and mental condition resembling the effects of alcohol or temporary insanity results from a lack of oxygen such as that experienced by high-flying aviators.

Marked effects on the personality and on mental processes are caused by oxygen deprivation, it was brought out by experiments reported last week before the New York Branch of the American Psychological Association by Dr. Ross A. McFarland of Columbia University. The results of these experiments may lead to the development of new methods of studying the physiological and psychological causes of mental breakdown, Dr. McFarland believes.

Loss of memory results from the lack of oxygen at altitudes of 20,000 feet or

more, and even below that height persons become unable, after a period of an hour, to keep their attention fixed or to perform tasks requiring judgment, patience or persistence. These effects occur in an insidious manner.

Emotional outbursts are characteristic, but individuals differ widely in their reactions, Dr. McFarland said. "Some reacted by marked irascibility of temper or by trying to break the apparatus to pieces; others by uncontrollable laughter, silliness, or flirting with the experimenter. There seemed to be some consistency in these reactions suggesting that the basic and uninhibited temperament of the individual had been exposed. . ."

If cars, with an average length of 14 feet, travel at five miles per hour, they need keep only 5 feet apart, and 1,380 can pass a given point in an hour. If they run at 10 miles per hour, the distance between must be increased to 11 feet, but the number of cars per hour is 2,100.

The number of cars per hour on the street increases with the speed, but the distance between the automobiles required for safe driving increases also. At first the necessary space between modern cars equipped with four-wheel brakes increases only slightly with their speed, but at about 23½ miles per hour the effect of the factor of safety of space between begins to affect the number of cars which the street can handle. At that speed, 2,600 cars per hour is the capacity of the traffic lane.

Science News Letter, April 25, 1931

Science News Letter, April 25, 1931

ASTRONOMY

Observations of Sunspot Variation

"A Classic of Science"

Schwabe's Years of Patient Observation Resulted in The Discovery of Mysterious Eleven-Year Sunspot Cycle

UEBER DIE FLECKEN DER SONNE, von Herrn Hofrath Schwabe. In *Astronomische Nachrichten*, Nr. 350. Altona (Germany), 1838. Translated for the SCIENCE NEWS LETTER by Helen M. Davis.

IN THE PAST year 1837 the activity of the sun in producing spots was so unusually great that I was induced to look back in my diary in regard to it, where I found a very noteworthy difference in earlier years. This strengthened my determination to publish the observations which I have made for the past 12 years upon their number and size, for a similar study is unknown to me.

I believe however that the following remarks upon the method are necessary, for, though indeed everyone knows how to make such observations, how persistently they remain neglected.

Since 1826, when I began to observe with two Fraunhofer telescopes of 3 and 6 ft. focal lengths, I have considered as groups only those crowds of spots which remain apart and are connected by no greater or smaller spots and no cloudiness. For this reason the count of groups depends upon the power of the telescope, and it often happens that crowds of many hundreds, indeed thousands of spots become only a single number, while one only stands by itself at the same time. But the tendency of the sun to bring the spots together into an aggregation is so great that different observers in the course of a year will in fact show but slight difference in count from my numbers. Moreover the influence which a significant difference will still have upon the result of my observations will be much diminished by a proportionate ratio, so I divide my results by the time during which I think they appeared as strongly as possible. It is not the number of groups but their reciprocal relation which seems to me worth counting, and this forms the purpose of this communication.

The first new spot which I see at the beginning of the year, I count as No. 1, and I continue by serial numbers until the end of the year, so that the old spots which continue over into the new year retain their numbers of the year before.

Of the two instruments, the 3½ ft. has an eyepiece with cross hairs for estimating the groups and a magnification of 45. With the 6 ft. I use a magnification of 64 only, to bring out every spot which must be counted in the group number, which would be overlooked in the small telescope on account of its faintness. Very seldom am I forced to use a magnification of 96 in doubtful cases. So I consider it practical to cover the objective with a capsule which for the 6 ft. has an opening of 2½ inches, and for the 3½ ft. of 1¾ inches, which can be widened by an arrangement if poor seeing in the heavens demands it. Through this I accomplish a two-fold purpose. First I avoid breaking the filters, which often causes a loss hard to replace, and second I can use brighter filters than if the objective kept its full opening. Besides, the best filters, which are unquestionably those of *Utzschneider* and *Fraunhofer*, lose in clearness and sharpness with greater saturation of color. I employ only the yellow and greenish colors, because they give the greatest definition and the least heating. . . .

Sunspots in Different Years

How different the numbers of sunspots and the size of the groups is at different times, the following resume and the remarks accompanying it show.

1826 I counted 118 groups
1827 I counted 161 groups
1828 I counted 225 groups
1829 I counted 199 groups
1830 I counted 190 groups
1831 I counted 149 groups
1832 I counted 84 groups
1833 I counted 33 groups
1834 I counted 51 groups
1835 I counted 173 groups

1836 I counted 272 groups

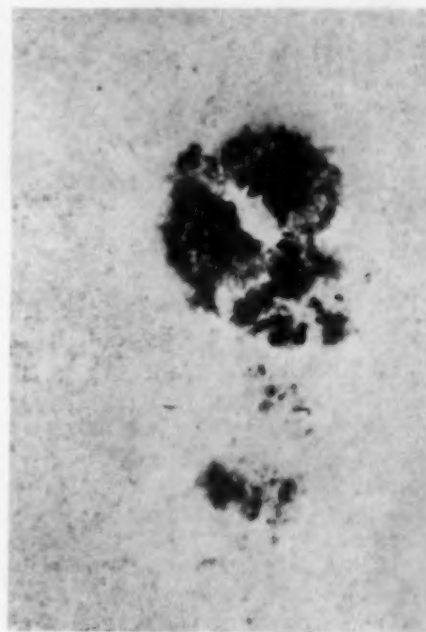
1837 I counted 333 groups

1826 I observed on 277 days, of which 22 offered no sunspots and many were almost free in August and September. The groups were not very abundant, in March a spot of outstanding size was visible. I saw bright flecks on the 7th and 8th of July and the 3rd and 4th of August.

1827. Observation days, 273. The sun was without spots only on the 21st and 22nd of January. The groups were rather abundant, irregular seed-spots appeared often. I noted bright flecks in April, May, June, July, August, September and October often following one another.

1828. Observation days, 282. No day without sunspots. The groups were usually very abundant and their spots appeared very rapidly. In May and September a spot was visible to the unaided eye. Bright flecks were common in June, July, August; scarce in April, May and September.

1829. Observation days, 244. No day without spots. The groups were somewhat scarcer by the end of the year, and diminished in abundance of their spots. In April appeared a notably



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large seed-spot. Bright flecks were scarce in June and July.

1830. Observation days, 217. The sun was unspotted only on January 24th. The groups often contained irregular seed-spots. Bright flecks appeared only on July 6th, very slightly.

1831. Observation days, 239. The sun appeared only on May 12th, July 2nd, and December 11th without spots. The groups were not very abundant and became constantly scarcer, yet they seemed least in April. Many times there would be only one very regular seed-spot of medium size visible, which had few secondary spots in its train. In June and July appeared broad zones in which the spots arose through strong clouds of light, large grains and distinct pores so conspicuous that they were visible as two belts. Bright flecks were very abundant in July and August; in April, May and September scarce and alone.

1832. Observation days 270, of which 49 days unspotted; the most of these were in July, August and September. The groups very poor; little spots dissolved very rapidly. No bright flecks.

1833. Observation days, 267. The 139 days when the sun showed no spots fell particularly in June, July, August,

October and November. The spots were single and small, often only points, which sometimes dissappeared in a few hours; in October a seed-spot was noticeable for its size and beauty. No bright flecks.

1834. Observation days, 273; 120 days without sunspots, which fell particularly in January, April, May, June, July and August; in December the spot picture increased considerably. No bright flecks.

1835. Observation days, 244. The 18 days without sun spots were mostly in January. The groups were many

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times composed of seed-spots with few grains and points. No bright flecks.

1836. Observation days, 200; on no day was the sun unspotted. The groups increased from March on very rapidly, yet the most numerous and abundant appeared only in one hemisphere of the sun. Most noteworthy was the sudden appearance of important seed-spots, and their changeableness. No bright flecks.

1837. Observation days, 168. The sun was never without spots, these increased constantly in the one hemisphere until it was seeded over with them, while more groups united through constantly appearing intermediate spots; their appearance and their changeableness was as sudden and as great as in former years; there appeared, however, more irregular seed-spots and such unusually great stretches of grains that after a chance counting and estimation these often added a thousand spots and points. Bright flecks I saw fairly plentiful only in August; in September scarcer and only one in October.

Heinrich Schwabe.

Dessau, February, 1838.

Science News Letter, April 25, 1931

More than 400,000 birds have been banded in the United States and Canada since about 1803, when Audubon marked a brood of phoebes with silver wire and was rewarded the following season by the return of two of the banded birds to nest in the same vicinity.

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MEDICINE

Goitres Occur in Epidemics, Mayo Clinic Study Suggests

EVIDENCE that there may be epidemics of hyperthyroidism, commonly known as goitre, was presented by Dr. William Carpenter MacCarty of the Mayo Clinic, Rochester, Minnesota, addressing the meeting of the American College of Physicians at Baltimore.

Dr. MacCarty's report was based on a study of over thirty thousand goitres, made during the past twenty years by his staff at the Mayo Clinic. Beginning about 1921, an increase of enlarged thyroid glands was noted. It is this increase which suggests the possibility of epidemics of hyperthyroidism.

A classification of goitres which would enable practicing physicians to determine the form of the enlarged gland by examination of the neck was given by Dr. MacCarty. Two-thirds of all the goitres examined during the twenty-year study fell in one class.

Thyroid extract need not be given in treating most cases of obesity or overweight, Dr. Frank A. Evans of Pittsburgh said at a symposium on the glands of internal secretion. Instead Dr. Evans recommended a diet of between 400 and 600 calories on which the too fat patients lose weight rapidly. They may be kept on these diets for months if necessary with nothing but improvement in their bodily condition. These patients feel better and have increased resistance to fatigue and they are contented with the diet. Thyroid extract should not be given because, among other reasons, it may disturb this feeling of contentment and well-being, and thus discourage the patient with the dietary regime on which he was improving, Dr. Evans explained.

An extract of pituitary gland is often a powerful remedy for relieving the distressing thirst of diabetes insipidus, Dr. Thomas B. Fitcher of Baltimore said. This extract may be given by hypodermic or as a nasal spray. Diabetes insipidus is not to be confused with diabetes mellitus, the disease in which the body is unable to store and burn up sugars. In diabetes insipidus there is no excess of sugar in the urine, but great thirst, a voracious appetite, weakness and emaciation are symptoms of the disease. Injury to a newly-discovered meshwork of nerve fibers lying

partly in the pituitary gland and partly in the neighboring part of the brain is probably the cause of diabetes insipidus, according to present theories, Dr. Fitcher explained.

The vital hormone of the cortex of the adrenal glands, which has saved the lives of patients suffering from hitherto fatal Addison's disease, was described by Dr. Frank A. Hartman of Buffalo, one of the investigators who prepared the extract containing the hormone.

Science News Letter, April 25, 1931

ARCHAEOLOGY

Pot-Hunters Damage Prehistoric Pacific Port

HOW HE has excavated the cemetery of "one of California's first great seaports" after it was threatened by a steam shovel and by curio collectors, is reported by Bruce Bryan of Los Angeles in *Art and Archaeology*. The seaport, which bears the long name Mishopsnow, was in ancient times a center of trade for Indians of the coastal villages and the outlying Channel Islands. The modern town in the neighborhood is called Carpinteria.

PSYCHOLOGY

Girls Learn More by Rote; Understand Less Than Boys

GIRLS may learn more by rote, but still understand less than boys. These sex differences in type of material mastered in school were indicated by the results of tests given over a period of five years to a group of 338 students, it was reported to the New York branch of the American Psychological Association last week.

Dr. Frederick H. Lund, of Temple University, Philadelphia, who gave the tests, found that the girls received higher school grades than the boys, but that the only objective tests which gave to the girls the superiority indicated by

The burial ground of the old seaside village was discovered when a steam shovel, excavating a road to the beach, tore through the middle of the graveyard, unearthing skeletons, tools, and weapons.

"Work was temporarily halted," Mr. Bryan states, "during which interval the public flocked to the scene armed with picks and shovels and wire screens. They proceeded to loot the old cemetery, and even the school children of Carpinteria were excused from classes that they might join in the gala treasure hunt. As a result, the damage done to the site from an historical and archaeological viewpoint was irreparable."

Later, Mr. Bryan obtained exclusive permission to excavate from the owner of the land. Describing the Indian remains which he has found in the old cemetery, Mr. Bryan cites a number of burials which show traces of battle, murder, and sudden death. When he examined one of the skulls, he found that "driven in under the base of the skull, just at the jointure of the neck, was a large flint spearhead measuring some three inches in length and broken off at the tip, obviously by the impact."

The inhabitants of the port were poor, judging by the plainness and scarcity of their possessions, Mr. Bryan points out. The complete story of Mishopsnow may never be learned, he predicts, for remains of the ancient village are cut through by an automobile highway and the land is divided into ranches and other property sites.

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the school marks were tests of English, language and literature. On a test measuring long-range memory for the material learned during the whole four years of high school, the results indicated that the girls forgot much more readily than the boys.

"Inasmuch as the data of this survey would seem to indicate that sensory-motor and verbal mastery may be all that is required in order to make grades and pass examinations in most subjects it constitutes something of an indictment of our educational system," Dr. Lund concluded.

Science News Letter, April 25, 1931

Second Edition---Entirely Rewritten

The VITAMINS

H. C. Sherman

Mitchill Professor of Chemistry, Columbia University

and

S. L. Smith

Senior Chemist, Office of Experiment Station, United States Department of Agriculture

A. C. S. Monograph No. 6

KNOWLEDGE OF THE VITAMINS has grown so greatly during the past few years that there is today a very great need for a new book on the subject.

This monograph has now been entirely rewritten and brought down to date with the intention of making it distinctly the outstanding book in its field.

It undertakes to treat its field both broadly and thoroughly, each of the six vitamins now generally recognized being discussed in its various aspects—the physical properties, the evidence as to purely chemical nature, the biological relationships and occurrence in nature, the methods of determination, the distribution in foods, and the significance as a factor in food values and in relation to nutrition and health.

In addition to this broadly inclusive text, the book contains an extraordinarily comprehensive bibliography arranged and set up in a manner which makes it exceedingly easy and practical to use.

The volume is thus designed to serve agriculturists, biologists, chemists, dietitians, food manufacturers and their technologists, home economics and nutrition workers, physicians, teachers, and many other readers interested in the present-day development of science and in the problems of food and health. To many students in this varied field, the bibliography alone may well be worth the price of the book.

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BOTANY

Nature Ramblings

By FRANK THONE

**"By Their Fruits"**

"WHEREFORE by their fruits ye shall know them."

Oak trees are good trees, and therefore acorns are by Scriptural rule good fruits. There is plenty of natural testimony to this end, borne by animals so diverse as squirrels and swine. Even man is an acorn-eater in some parts of the world; before the padres brought grain to California the Indians there pounded the fruits of the oak to the meal which was their staff of life.

But acorns are not just acorns. Every oak differs from every other oak, and each oak species bears a quite distinctive acorn. In fact, the acorns are often more distinctive than the trees that bear them. Some nearly related oaks look so much alike in trunk and branch and leaf that even a botanist or a forester will be stumped at first to tell them apart, but if he can find a few of their acorns lying about his difficulties are over.

Some specimens of black oak, for example, look rather like red oak trees. But they always bear black-oak acorns, whereon the cups are deeper, more conical and more shaggy-scaled than are the red-oak acorn cups. The cup of the red oak is really more like a saucer. It is shallow, flat, close-scaled, and it just grips the base of the acorn. Strongly contrasted with this is the acorn of the bur oak, which is frequently buried almost to the tip in the shaggy coat of its cup.

In shape also the acorns are distinguishable. The acorn of the bur oak is usually big and round and plump, that of the white oak and the red oak middle-sized and bluntly pointed, while the acorn of the black oak is slender, almost bullet-shaped.

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ARCHAEOLOGY

Prehistoric Remains to be Sought by Engineers

COOPERATION between scientists and engineers, road builders and other professional men conducting large-scale digging operations, in a search for remains of early man in America, has been arranged at a conference held in Chicago under the auspices of the National Research Council.

Because some of the most important of the old-world finds of ancient man were made in quarries, gravel pits and other utilitarian excavations, it was believed by the organizers of the program that a well worked out plan, enlisting the assistance of interested engineers and contractors, might be productive of equally important results on this continent.

Prof. Fay-Cooper Cole of the University of Chicago introduced the general subject of early man in America, and Dr. W. C. Alden of the U. S. Geological Survey discussed the spread and movements of the great ice sheets in the Middle West.

What the engineer or roadbuilder may do, to be of the greatest service to science, was suggested by Dr. M. M. Leighton, chief of the Illinois State Geological Survey. He said, in part:

"Engineers and operators in charge of all kinds of excavation work such as road building, sewer construction, dredging ditches, quarrying and clay, sand, and gravel industries, are in position to make valuable contributions to science with regard to the geological history of man in America, by preserving in situ suggestive evidences of human occupation, whether it be skeletal remains or the relics of his activities, until the scientific evidence of the geological position and age can be determined by a geologist and notifying the State Geologist of that particular State regarding the potential discovery; such leads should be followed by prompt examination on the part of the State Geologist or some capable geologist whom he may designate.

"The whole procedure could be encouraged by the establishment of a geological minute-man service similar to the archeological minute-man supported by Science Service, whereby moderate sums covering the cost of the field examination may become instantly available. . ."

*Science News Letter, April 25, 1931***Chemical Music**

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There has always been a close bond between mathematics and music in addition to that found in the study of harmony. It is the commonest thing for a mathematician to be a great lover of music. Mathematics is the most abstract of the sciences, music the most abstract of the arts.

Perhaps the mind uses similar abilities in these two activities. Despite the apparent gap between art and science they have much in common.

You have probably thought of the scientist as rather an insensitive person intent on achieving results of use to humanity and altogether lacking in playfulness or feeling for beauty.

Great world scientists have not agreed with this view. There is indeed much of the scientist's work which must be done in a chilly, unemotional atmosphere but unless a quality is present from time to time, similar to what we find in creative artists, great science does not arise or grow.

Science News Letter, April 25, 1931

A Dutch air mail line covers 10,000 miles between Amsterdam and Batavia.

**Ancient Civilizations of the Andes**

by

Philip Ainsworth Means

A complete account, based on years of study and exploration, of the great Inca dynasty and its predecessors in South America. Every phase of Inca and pre-Inca culture is fully described and discussed.

"A picture of ancient life and times in the coast and highland of western South America which is a delight to the lay reader and a mine of information for the historian and scientist."

—Ronald L. Olsen in the *New York Times*.

539 pages, 223 plates

\$7.50

Charles Scribner's Sons, New York

• First Glances at New Books

Biography

MASTER MINDS OF MODERN SCIENCE—T. C. Bridges and H. H. Tiltman—*Dial Press*, 278 p., \$3. The personality and researches of twenty-four outstanding scientists of the world are here set forth in a popular vein. The book is entertaining and designed for the casual reader of science rather than the research student.

Science News Letter, April 25, 1931

Ecology

ECOLOGICAL MONOGRAPHS—A. S. Pearse, Managing Editor—*Duke University Press*, Quarterly, \$6 per year. Ecologists in this country have long felt the need for a journal that could take care of papers too long to fit into the already over-crowded botanical and zoological periodicals and yet not long enough to justify publication as books. To meet this need *Ecological Monographs* has arisen, its first issue being dated as of January, 1931. The contents of this first number consist of two papers: Edith S. Bowen on The Role of the Sense Organs in Aggregations of *Ameiurus melas*, and Robert Marshall on An Experimental Study of the Water Relations of Seedling Conifers with Special Reference to Wilting.

Science News Letter, April 25, 1931

Biochemistry

THE MATERIALS OF LIFE—T. R. Parsons—*Norton*, 288 p., \$3. This popular presentation of biochemistry, using no formulae but nevertheless going into considerable detail, will depend for its success on the intrinsic interest of the subject-matter rather than on tricks of style. Sugar, starch, fat, energy, the living fire, digestion and indigestion, muscular exercise, blood and iron, vitamins, disease are among the topics discussed. It should prove its success with those who don't mind digging for mental food.

Science News Letter, April 25, 1931

Physics-Photography

FILTERS FOR THE REPRODUCTION OF SUNLIGHT AND DAYLIGHT AND THE DETERMINATION OF COLOR TEMPERATURE—Raymond Davis and K. S. Gibson—*Government Printing Office*, 165 p., 45c. A standard daylight is necessary in photographic and other scientific work. Natural daylight is constantly varying in color with the condition of the sky, the time of day, etc. These two Bureau of Standards sci-

tists have designed filters for the production of white light, tested many that are in use and compared the results with the various kinds of daylight. The details of this fundamental research are contained in this publication.

Science News Letter, April 25, 1931

General Science

MORE BONERS—Compiled by Alexander Abingdon—*Viking Press*, 89 p., \$1. Glycerine is a vicious liquid, miserable in water in all proportions. A problem is a figure which you do things with, which are absurd, and then you prove it. An octopus is a person who always hopes for the best. Hereby it is abundantly evident that the appeal of the erudite Dr. Abingdon to his fellow-members of the long-suffering teaching craft, to send in samples of their choicest, has not been in vain. It is to be hoped that there will be many more volumes in this series, all illustrated, as the first two are, by the eminent Dr. Seuss.

Science News Letter, April 25, 1931

Ophthalmic Hygiene

YOUR VISION AND HOW TO KEEP IT—H. G. Merrill and L. W. Oaks—*Putnam's*, 145 p., \$1.50. This clear and interesting exposition of an important subject will be welcomed by the layman who will find in it the answer to many questions besides much good advice.

Science News Letter, April 25, 1931

Ornithology

GLIMPSES OF FAMILIAR BIRDS—William H. Carr—*Gabriel*, 157 p., \$1.50. A most attractive little book, giving popular descriptions and very clear colored plates of some fourscore common songbirds and their eggs. Under each plate is a blank for the reader's entries regarding the appearance or habits of the species in his own neighborhood.

Science News Letter, April 25, 1931

Physics

PHYSICS, A TEXTBOOK FOR COLLEGES—Oscar M. Stewart—*Ginn*, 770 p., \$4. This excellent text has been widely used by college teachers. The present volume is a thorough revision which makes full use of "modern" physics and of the new applications of physics, yet the treatment remains unchanged.

Science News Letter, April 25, 1931

Medicine

WHAT EVERYONE SHOULD KNOW ABOUT CANCER—*American Society for the Control of Cancer*, 27 p., free. This is an authoritative booklet about cancer written for the layman. It will answer correctly his questions as to what cancer is, what causes it, how it may be cured or prevented and what to do if he suspects he has it.

Science News Letter, April 25, 1931

Physiology

KOSTYCHEV'S CHEMICAL PLANT PHYSIOLOGY—S. Kostychev, Trans. Chas. J. Lyon—*Blakiston* 497 p., \$6. An original Russian work which brings plant physiology to the same level as human or animal physiology. Full use is made of the parallel disciplines of physical chemistry in catalysis and colloids and of structural organic chemistry. Photosynthesis, nutrition, carbohydrates, proteins, secondary plant substances, respiration and fermentation are discussed. Kostychev regrets that his book omits treatment of the physiological significance of specific cell and tissue structure.

Science News Letter, April 25, 1931

Chemistry

LECONS DE CHIMIE ANALYTIQUE—Alcide Journaux—*Hermann et Cie.*, 350 p., \$2.40. Despite its title this book does not deal with volumetric analysis. Gravimetric, organic and electrolytic methods are described in detail for a large number of common anions and cations. Makes little use of modern physico-chemical viewpoints.

Science News Letter, April 25, 1931

Evolution

CREATION BY EVOLUTION—Edited by Frances Mason—*Macmillan*, 392 p., \$2.50. Priced originally at \$5, this symposium of essays on evolution by 24 leading scientists is now offered at a lower figure. The list of authors includes such names as Jordan, Morgan, Lull, Jennings and Wheeler.

Science News Letter, April 25, 1931

Geography-Politics

THE PHILIPPINES, PAST AND PRESENT—Dean C. Worcester—*Macmillan*, 862 p., \$6. A new edition, in one volume, of a well-known *apologia* for American rule in the Islands, with a biographical sketch and four additional chapters by Ralston Hayden.

Science News Letter, April 25, 1931